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Setting up LIGHTWAVE NETWORKS

Inside:

'Giddy Up:' Animal Animation

From the Net: Faking Soft Shadows

ANIMATION STILLS

Fan-tasy

The fan sequence is projected onto the floor from a series of overhead spotlights. The same sequence is mapped onto a flat rectangular polygon and used as a diffusion map over a front projection map of a cloudy sky. Haze was added to the ground plane by activating glow.
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Go Soft on Shadows

Rather than using LightWave's RAM-hungry Shadow Map feature, animator Dan Ablan faked this soft shadow by creating a shadow object, partially dissolving it, then using a blurred shadow image as a Transparency Texture.
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EDITOR'S MESSAGE

by John Gross

At one point Allen Hastings wanted to see LightWave everywhere on TV. Well, nowadays, if you watch TV at all you will probably see LightWave. Not only is it used in commercials and infomercials (the newest is probably Digital Domain's Duracell commercial - look for the hopping battery), it is used in some capacity in just about every sci-fi show on TV.

Today, Area 51 is using LightWave for *X-Files*, *Millenium* and *Buffy The Vampire Slayer* on the Fox Network, plus *Dark Skies* on NBC. Foundation Imaging is using LightWave for *Star Trek: Voyager* and Digital Muse is using it for *Star Trek: Voyager*, *Deep Space Nine* and *Sliders*.

Now that Allen has his dream of television use fulfilled, the next logical step is film. LightWave can help out there as well. Not only has it been used for trailers (*Star Trek: Next Generation* and *First Contact*, *Cutthroat Island* and *Nick of Time*), but it is now currently being used for entire features. Computer Cafe is using LightWave for the many shots (209) in *Warrior of Waverly Street* and *Sprung*, both from Trimark (release - Januay 1997).

Digital Domain is expected to use LightWave for some special effects shots for director James Cameron's upcoming *Titanic* and a few of the LightWave houses like Digital Muse have some exciting film projects in the works that can't be discussed yet.

LightWave is already taking Hollywood by storm as far as TV is concerned. Game companies like Origin and Interplay are currently using LightWave for many things and LightWave is breaking into film. What's next for LightWave? Well, with the Mac version coming around the corner, who knows what other types of establishments LightWave will get used in. Certainly Web site creations and print work spring to mind, but I'm interested to see what other applications are out there.

For those of you that have been with LightWave for awhile, you should be able to see that your opportunities are ever-increasing. For those of you just jumping in, welcome to a great place.

John Gross
Editor

TABLE OF CONTENTS

Vol. 4, No. 9

4 From the Net
by Dan Ablan
Learning how to fake shadows can save you precious RAM and significantly reduce rendering times, no matter what version of LIghtWave you're using.

6 Getting to Know Networks
by John Crookshank
When it comes to networking your LightWave computers, you can never know enough. Learn how to link PCs and Amigas in Part One of this two-part primer.

8 Animal Animation
by James M. Curtis
Ready to tackle one of the most difficult animation challenges? Learn how to use Bones to create realistic movement in horses and other animals.

12 Surface Effectors
by Prem Subrahmanyan
A LightWave user takes surfaces into his own hands, creating a new plug-in that allows all the basic surface attributes to be modified by animating null objects.

14 Instant Atmosphere
by Patrik Beck
There's nothing quite like a rotating fan to add atmosphere to your 3D animations. Find out how using spotlight projection maps in LightWave 5.0.

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About this month's cover: The tornado image was created by animator/author Dan Ablan and was considered for the cover of his newly-released book, The LightWave Power Guide, *from New Riders Publishing. The scene, included in the book as a tutorial, was built entirely in LightWave 3D.*

From the Net

How to Get Along with Less RAM

by Dan Ablan

Greetings fellow LightWave geeks. You know, as the years go by, you begin to learn that faking things is really an art all its own. I'm not talking about being a fake, but rather, faking effects in LightWave. I think starting out with a simple Amiga with 12 MB of RAM is a good thing, only because you learn to make use of your resources and learn how to properly construct animations. Too often, I run into LightWavers who were spoiled with 32 MB of RAM when they started out, and they sometimes don't know the art of faking. Why would they? They had enough RAM to load full 24-bit images, and use high polygon count models that are over-built in their animations. Learning tricks to save memory and render time can help you throughout your career, even if you now work on a 300 Mhz Alpha-based LightWave workstation, with 128 MB of RAM. Granted, on simple scenes, it would barely matter, but in larger scenes, every bit helps.

This article is for our beloved Amiga LightWavers forging ahead with 3.0, and even 2.0 versions of LightWave. I've heard from some of you, and understand your neglected feelings given all of the "5.0" talk. Well, here's a quick tutorial that anyone can do.

Building Shadows

When the Shadow Map feature was introduced, LightWave-generated images took on an entirely new look. What many of us on Amigas quickly learned is that Shadow Maps are RAM hungry, and could not be used as often as we would like. Here's a tip you can employ into your animations to save RAM and rendering time, no matter what version you have. Faking shadows is nothing new for many LightWavers, but you can also fake soft shadows. I recently did a very low budget project in which a car needed to drive down a road past a few key billboards. Because of the time frame and lack of funds, using shadows was not an option. So, I faked it. It probably added 3 or 4 seconds to each rendered frame, which was do-able. No matter how low-budget this thing was, the car needed a shadow beneath it to look right. Using the ever-popular Porsche object from the Vehicles directory, a fake shadow can be made.

1. Load Modeler and load the Porche.LWO from the Vehicles directory. You'll see that my car is a convertible. That's because the client wanted it that way, so I cut the roof off. The regular Porsche will work just fine. If you've deleted this object, load any car that you might have. In a new layer, select the Sketch tool. To be honest, I'm not sure if 2.0 has the sketch tool (sorry!), so in that case, you can use the Create Points function from the Polygon menu.

2. Now, in the top view, draw out around the shape of the car (or create points) so that you have a shape similar to the one in Figure 1. What you are doing here is literally drawing the shadow.

3. Once the curve is drawn with the Sketch tool, use the Freeze tool to turn the curve into a polygon. If you created points, hit return.

4. At this point, you need to orient the polygon underneath the car. So, paying attention to all views in Modeler, move the curve to that it is resting on the 0 Y axis, as in figure 2.

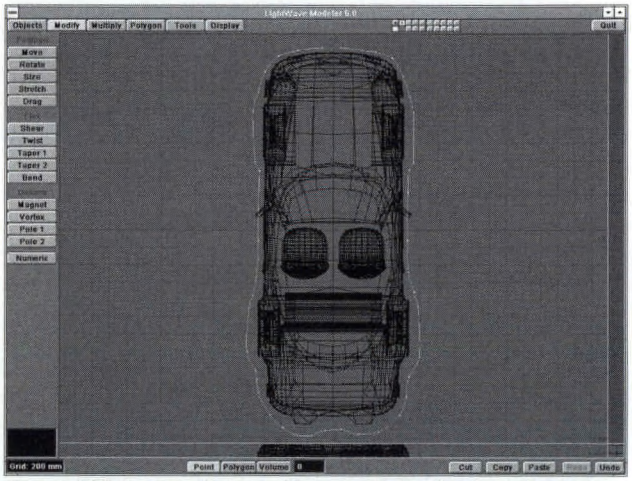


Figure 1: With the car in a background layer, use the Sketch tool to outline shadow.

Figure 2: The shadow polygon is moved beneath the car before being saved.

5. Select the polygon, and make sure it's facing up. If it's not, press f to flip the polygon.

6. Press q to Change Surface, and name the polygon CarShadow, or something like that.

7. Save the object.

8. Enter Layout, and load the car and car shadow objects.

9. Select the Shadow as the current object, and parent it to the car. Now, depending on where your car is being lit from, you can move the shadow off to one side or another. Color the Shadow as 0,0,0, RGB and make sure the diffuse level is set to 100%. Leave all other settings at zero.

10. I've loaded the Road object from the Landscape directory, and made sure it's sitting just beneath the shadow object. You can build your own road if you like, or even use a long flat gray polygon. Check the position of each object using the numeric information panel in the bottom right corner of the Layout screen, as in Figure 3 at left.

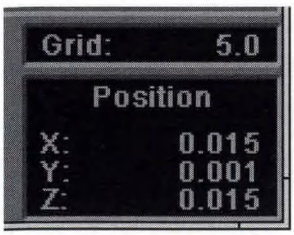


Figure 3: Use the information panel to check object positions.

11. Make sure each object is resting slightly above the other. The Car should be just above the shadow, and the shadow should be just above the road. Just above means a value of .001 is fine.

12. Go to the Objects panel, and select the CarShadow object as the current object, and set its object dissolve to around 50% or 60% transparent. Using an object dissolve works the same as using Transparency from the Surfaces panel, but isn't as slow rendering.

13. Set a decent camera angle, and render the scene. Figure 4 shows what the sharp-edged shadow looks like beneath the car.

Soft Shadows

14. This isn't bad, and gets the job done. But it can be better. If the shadow were soft, as if from a shadow-mapped light source, it would look more realistic. Instead of turning on transparency, and setting transparent edges, you can achieve the soft shadow effect with an image map.

15. Save your objects, and save the scene. Clear the scene, and reload the shadow object. Set the background color to 255,255,255, RGB (white), and rotate the shadow -90 on the Pitch. Move the camera back on the Z slightly so that the shadow is in full view. Make sure the object is 0% transparent, and not dissolved. Render the black shadow over the white background, so that you have an image like the one in Figure 5.

16. At this point, you can bring the image into a paint package of your

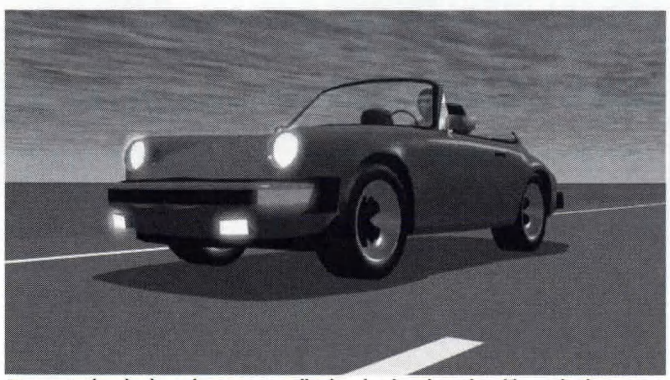


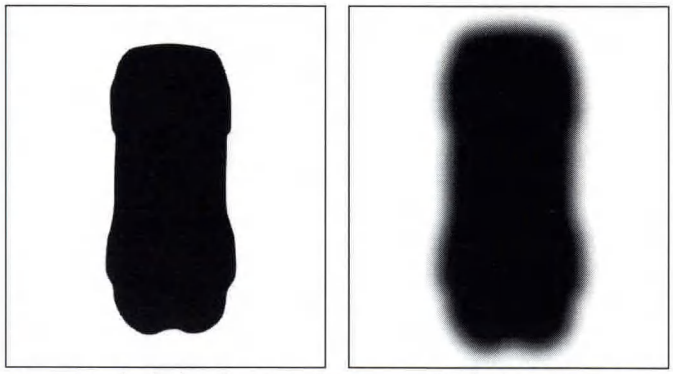
Figure 4: The shadow object is partially dissolved and renders like a shadow.

choice, such as ToasterPaint, ImageFX, ADPro, or even Photoshop. Once the image is loaded into the paint program, crop the image leaving just a small white border around the shadow. Now, select the blur option for your particular paint package. In this case, I'm using Adobe Photoshop 3.0's Gaussian Blur set at a radius of 8.0 pixels. Figure 6 shows the image blurred.

17. Save the image and go back to Layout. Reload the car scene with the shadow. Now, load the new blurred shadow image.

18. Make sure the object is not dissolved, and 100% visible. From the Surfaces panel, select a transparency texture for the shadow object. Place the image as a Planar Image Map on the Y axis, and use Automatic Sizing to fit the image. (2.0 LightWavers may need to test the placement of the image). Figure 7 shows the Transparency Texture screen from LightWave 5.0, but the principle will work in previous versions.

19. Go back to Layout, and render the scene again. Now, your shadow under



Figures 5-6: The shadow object is rendered over a white background, then given soft edges with Gaussian Blur in Adobe Photoshop.

the car should be soft, like a shadow mapped shadow, but without extra rendering time.

20. If you see edges of the polygon, adjust and scale the sizing of the shadow image on the object if needed. See the color pages for the final image with the faked shadow.

Because the shadow was parented to the car, it will move with it. You can used this same technique for other simple objects, even text. Faking shadows on text is a great way to speed up rendering. Here's what you do. Make your text in Modeler. Name the surfaces. Copy the text to another layer, and move it behind and down from the original text objects. Rename this surface as "Shadow." Put the two layers together, and save the object. In Layout, you can load and image and place it in the background which takes no time to render, but still be able to cast a shadow because you've faked it. When you surface the text object, color the words in front whatever you'd like, and for the shadow surface, make them partially transparent, and a dark gray. There you go, faked text shadows, with minimal rendering time. This is good to save rendering time, but also good because if you are using a background image (or sequence) you can't cast

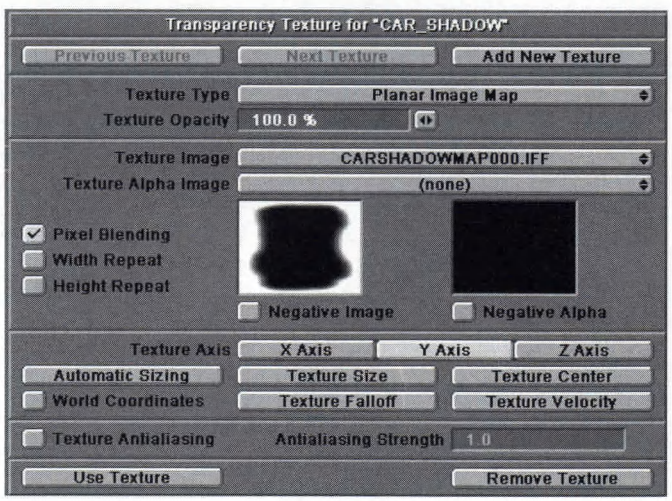


Figure 7: The blurred image is placed on the object as a Transparency Texture.

shadows. By faking it though, you can.

This is a simple tutorial, but one that can be implemented at any user level. It's here because it came From The Net. Remember to e-mail me with your ideas, comments, or questions at dma@mcs.net. See you next time! LWP

Dan Ablan animates with LightWave 3D, for his company AGA Digital Studios in Chicago. Check out his book, The LightWave Power Guide, *available now at local bookstores, or directly from New Riders Publishing.*

Getting to Know Networks

A Two-Part Primer on Linking LightWave Machines

by John Crookshank

Thanks to the inclusion of ScreamerNet with LightWave 4.0 and higher, you may use a single copy of LightWave to render your work on multiple computer systems, greatly speeding up rendering times. And, if you have several computers around, ScreamerNet will allow you to use Modeler on one system while the others are busy rendering. ScreamerNet is even flexible enough to allow distributed rendering on different computer platforms, provided LightWave is running on each platform that you intend to use. Finally, even with only one computer, ScreamerNet can automatically batch render several scenes without intervention. This is quite handy if you have some smaller scenes and want to render them overnight.

Before you can start "Screaming," you have to have a network up and running. Is it worth the time, effort and expense? If you have multiple computers and use LightWave to make a living, the answer is a *resounding* yes. Although this article is aimed at LightWave owners with both Amigas and Windows systems, most of it also will apply to SGIs and Macs.

A Network Guide

This article will guide you through the process of setting up a simple network linking an Amiga and a PC using either Windows 95 or Windows NT. The NT instructions also apply to other Windows NT platforms such as Alpha and MIPS systems. Note that the emphasis here is simplicity. The information is intended for small guys who just need to move a bunch of pictures around a lot. A larger shop with many computers will have networking needs much more complex than the simple setup discussed here. If you already have an existing network, please consult with the person who maintains your network before trying any of this.

The basic requirements to network your systems together are:

- An Intel system running either Windows 95 or Windows NT (or an Alpha or MIPS system running NT).
- An Ethernet card for the PC.
- NFS Server and/or NFS Client software for the PC.
- An Amiga running AmigaOS version 2.1 or higher.
- An Amiga Ethernet card.
- INET-225 TCP and INET-NFSd software or AmiTCP and Samba software.
- Ethernet cables and connectors.
- Pad of paper for notes.
- Patience...

The most common types of network hardware are 10-Base-T, 10-Base-2, and 100-Base-T.

The 100-Base-T Ethernet cards are faster and more expensive, but are incompatible with Amiga Ethernet cards. The 10-Base-T card is the most popular network card in the PC world. However, it requires the extra expense of a 10-Base-T Hub and is supported by only two Amiga networking cards.

The 10-Base-2 Ethernet, which uses coaxial cable, is not quite as popular in the PC marketplace. However, PC Ethernet cards that support 10-Base-2 are readily available. Many manufacturers have "combo" cards that have both 10-Base-2 and 10-Base-T connectors on them. You can then purchase any Amiga Ethernet card and be assured that it will be compatible. Using the coax 10-Base-2 cabling is by far the easiest and cheapest network to set up, and there are no performance advantages to using one over the other on a small and simple network.

A warning on PC Ethernet cards: Do not buy the cheapest card you can find. If you purchase an Ethernet card with 32-bit drivers for Windows 95 or Windows NT, and get a PCI card if you have an available PCI slot, you will probably be OK.

Almost any Amiga Ethernet card will work fine. However, I have heard from NewTek that the ASDG Lan Rover (EB920) cards do not work with AmiTCP, so you should probably avoid that brand. Unfortunately, Amiga Ethernet cards cost more than three times as much as a PC Ethernet card.

Windows Does Networks

Windows 95 and Windows NT (all platforms) come with the software required to share files with other Windows systems. Unfortunately, the software included with Windows will not directly allow file sharing with any other types of computers.

When talking about networking software, you will hear the terms Client and Server. If you have Server software installed on your system, other computers on the network running Client software can "see" your computer. They can connect to your drives, but you can't connect to their's unless you install Client software on your system. When all the systems on a network run both Client and Server software, it's called a peer-to-peer network because all systems have equal access.

This is a very cool arrangement, since you can get at any graphics file that is on any computer you have, including PAR, PVR and Flyer drives. Yes, you can have a remote computer directly use Perception or Flyer video clips as image sequences without having to break them up into frames first. And you can send rendered frames from your networked computers to a Perception or Flyer for playback. This feature alone makes the expense and work of setting up a network worthwhile.

ScreamerNet requires a network where all your systems can connect to a common drive that contains the scene file and all it's elements, as well as a common drive to store all the rendered frames. ScreamerNet does not require a full peer-to-peer network system, but you get the most flexibility in sharing your graphics files between computers and applications if you set up a full peer-to-peer network.

Going Peer-to-Peer

For a full peer-to-peer network, you will need the basic networking software, plus network file-sharing Client and Server software for each system. Windows 95 and Windows NT (any platform) already include the basic networking software. You have to add NFS Server and NFS Client software to a Windows system to be able to share files with any other type of system.

On the Amiga, you will need the basic networking (TCP/IP) software, plus a Server package. Both available Amiga TCP/IP packages come standard with NFS Client software, so you will only have to add a Server package to complete the two-way connection desired.

Interworks, maker of the basic INET-225 TCP/IP software for the Amiga, also makes an NFS Server package to mount your Amiga drives on your PC system. It requires adding an NFS client package on the PC to complete the connection. The Interworks NFSd package is very easy to set up, and is a standard NFS Server package, so it can be used with virtually any system on the market that has an NFS Client package available for it. Interworks has a U.S. office for telephone support, which is a real plus if you have problems with your setup.

The other TCP/IP package for the Amiga is AmiTCP. Although it does not offer a NFS Server package, there is a shareware add-on for AmiTCP called Samba. Samba is a Server application used in place of a NFS Server package. Samba only allows connections from Windows systems. Samba is very cryptic to set up and is very slow, but it works OK once it's running. Samba also does not require NFS client software on the PC. It works with the standard Microsoft networking software that is included with Windows 95 and Windows NT. AmiTCP is produced in Finland, and has virtually no US support at all, a "feature" that must be considered carefully.

Getting Started

Before you start doing anything, you need to plan a little bit. You will need to make a list of your systems and usernames, etc. and write these down before you begin. You will need a list of the following:

- A name for each computer.
- An IP address for each computer.
- A login name for the user who will use each computer.
- The drive names that you need to make available to the other systems.

Keep your names short and simple, and do not use spaces or punctuation in the names. When you are done, you'll have a list something like this:

Computer (Host) name:	pc1
IP Address:	200.0.0.1
Username:	john
Password:	Lightwave
Workgroup:	workgroup
Computer name: amiga1	
IP Address:	200.0.0.2
Username:	john
Password:	Lightwave
Workgroup:	workgroup

If you have additional computers, continue adding them to this list. Use the IP numbers that I have here. Don't make up your own IP numbers, unless you have an existing network and your network administrator tells you to do so. The only thing that will change from system to system is the computer name and IP address. The rest of the data will stay the same on all the systems. Notice that I used the same username, password, and workgroup name on each system, and that I used only lowercase when typing the names, but upper and lower case on the password. The AmiTCP software requires passwords to be in mixed case, but the rest of the settings can be however you want. Be sure and write these down, as you will need this information again later.

Windows 95

We'll start off with installing networking for Windows 95 since it's so popular. Windows 95 will most likely automatically detect the presence of your new Ethernet card when you turn the system on, and automatically install the driver software for you or prompt you to insert the driver diskette. If not, load up the Control Panel and select 'Add New Hardware'. Windows 95 will again try to figure out by itself what you have, but if it does not, you can select 'Network Adapters' and then select the "Have Disk' option to have the driver installed from the disk that came with the Ethernet card.

After the driver for the card has been installed, you'll need your Windows 95 CD to install the networking software. Make sure that you select "Client for Microsoft networks," NetBEUI, and TCP/IP to be installed. You can select Add -> Protocol -> Microsoft -> TCP/IP and NetBEUI to put these items in the list. When you are finished, the list of networking items should show the following:

- Client for Microsoft Networks.
- Your Ethernet adapter.
- NetBEUI.
- TCP/IP.
- File and Printer sharing for Microsoft Networks.

You will also be prompted to enter your computer name, workgroup name and user name once the networking installation process is started. In the Network panel, select the entry that shows TCP/IP -> Ethernet adapter and click the "Property" button to set up the TCP/IP software. Click the IP address tab and click Specify an Address. Enter the number 200.0.0.1 in the IP Address box, and enter 255.255.255.0 in the Subnet Mask box.

Click the File and Print Sharing button and make sure that "I want to be able to give others access to my files" is selected. If you also select Windows Logon in the Primary Network Logon box, you won't have to enter a password every time you start up your system. Select OK, and the information will be saved, and your system will reboot.

For the NFS Server software on Intel Windows 95 and Windows NT, I use TropicNFS Server. If you have a DEC Alpha system, Intergraph sells several NFS Client and Server packages that you could use instead. Install the NFS Server software on the PC in a directory of your choosing. In the NFS Server directory, you only have to create a file called exports to tell the NFS Server software which drives to make available (export) to the Amiga. Use Notepad to type in the lines below and then save the file as 'exports' in the NFS Server directory. My exports file looks like this:

```
# Export root directory of disk D: and E: to amiga1
d:/ 200.0.0.2
e:/ 200.0.0.2
```

The line starting with the (#) character is a comment, and is not required. In this example I am exporting my drive D:\ and E:\, and the IP address is the IP address of the computer(s) that will be allowed to connect to the drive. Note that I used a forward slash, not the typical back-slash after the drive name. Add extra lines for extra drives that you wish to make available to the Amiga. If you have more than one Amiga, list all the IP addresses one after the other, such as:

```
d:/ 200.0.0.2  200.0.0.3  200.0.0.4
```

This would allow these three systems to connect to your drive D:\. Save the exports file, and you're done on the PC side for now.

Windows NT

After installing your Ethernet card, Windows NT may automatically detect it and prompt you to install the software for it. If not, enter the Control Panel and select Network. You will be prompted for the Windows NT CD-ROM , then follow the prompts to select the card driver and software components that you want installed. Make sure that you have the following items selected in the list when you are finished:

- NetBEUI.
- NetBIOS Interface.
- Server.
- TCP/IP Protocol and related components.

To configure the TCP/IP software, select TCP/IP Protocol in the list and click Configure. At the TCP/IP configuration panel, enter 200.0.0.1 in the IP Address box, and 255.255.255.0 in Subnet Mask. Click OK to save and reboot.

The setup of TropicNFS software is identical under Windows NT, so it won't be repeated here. At the time of this article, only a Windows 95 version of TropicNFS was available, but it installed and ran with no problems whatsoever under Windows NT on an Intel system. They should have a NT version soon. An Alpha NT version of TropicNFS is not planned. Intergraph has several NFS Server and Client packages available for the Alpha NT, and their

see Networking, page 16

Animal Animation Tricks

Put a Horse Through Its Paces With Bones

by James M. Curtis

One of the hardest things to do in 3D is animate living things. This is especially true of animating animals that we are familiar with. This month's tutorial will take you through the steps to animate a horse using Bones. We will create a normal-paced, four-legged walk.

I will be using version 3.5 LightWave Modeler and Layout for this tutorial. The method was designed as a way to overcome 3.5's limitations, but its application is still useful for versions 4.0 and 5.0.

A Horse is a Horse

To complete this tutorial, you'll need a horse object. The one used here is from the public domain. I've had it for years, and can't recall where I got it. I have modified it substantially from its original form, adding more detail and correcting some anatomical and polygonal errors.

This tutorial is written based on my horse object. The parameters described here may need to be adjusted for any other horse. Variations on the following procedures can also be applied to other four-legged animals.

Preparing the Horse

One of the difficulties with LightWave 3D 3.5 (and to some extent 4.0) is how Bones work. As you put bones into an object, and proceed to bend (rotate) a bone, it tends to affect other parts of your object. Even turning on Limited Region (Objects-Bones Panel) and setting a smaller Influence range doesn't always cure the problem. The greatest distortion occurs at points directly across from, or behind, the bent bone. [Ed note: version 5.0 includes some great new features - Falloff Type, Muscle flexing and joint compensation - that allow for more intuitive bone displacement -jg]

There are ways to circumvent this. One is to make sure the limbs are all straight out to the sides, so that the influence of the bones being initially near other parts of the object is minimized. In my experience this helps, but it leaves an unnatural crease at the joints in the animal. So, how do we prevent this?

The method I've successfully used, involves splitting the object. Here's what to do:

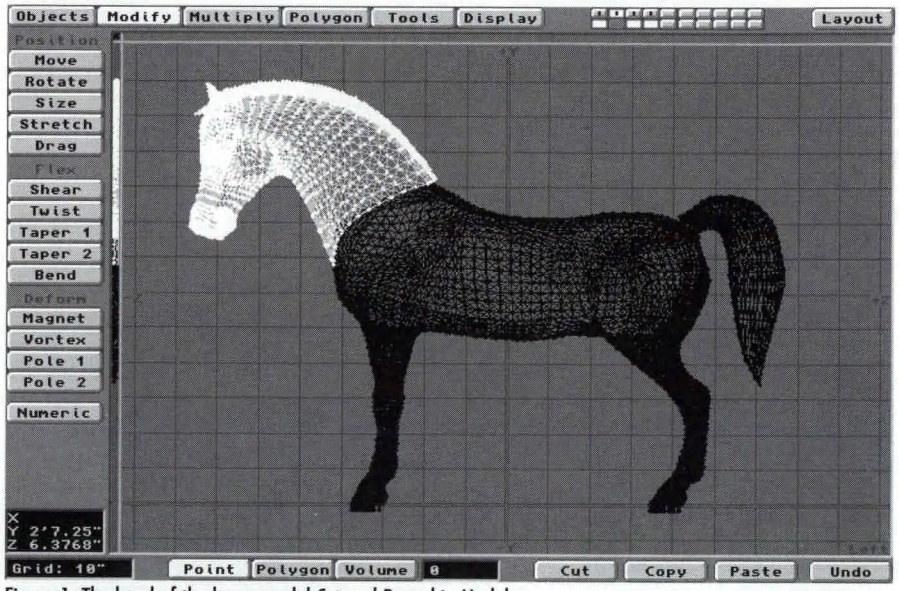


Figure 1: The head of the horse model Cut and Pasted in Modeler.

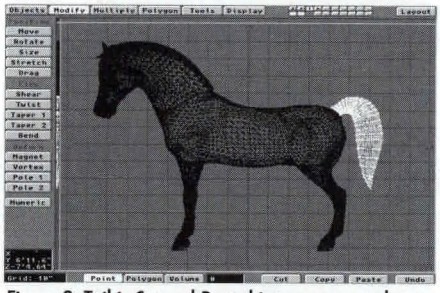


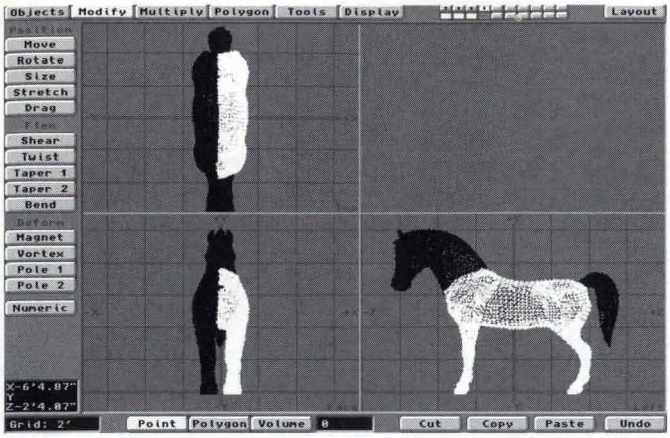
Figure 2: Tail is Cut and Pasted into a separate layer.

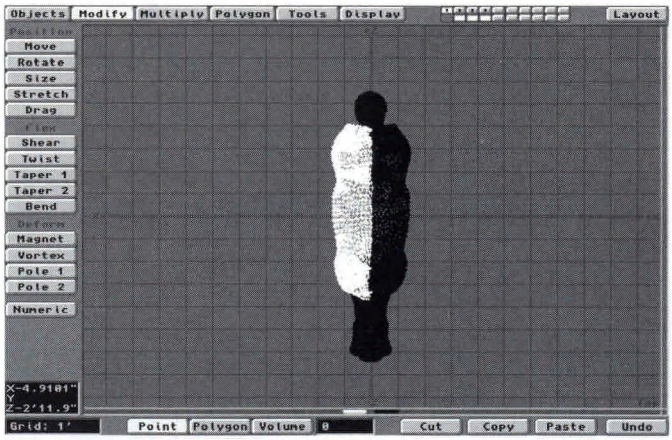
- Take the object and load it into Modeler.
- From the Left View, choose the Polygon Select button at the bottom of the screen.
- Use the Right Mouse button to Lasso all of the polygons of the head and neck.
- Cut these polygons and paste them onto Layer #2 (Figure 1).
- Now Lasso the polygons associated with the tail (or select the Tail surface if there is one).
- Cut these polygons and paste them in Layer #3 (Figure 2).
- Go to the Top View, select the Exclude button at the bottom of the screen.
- From the Top View, drag out the bounding box around the left half of the object (right side of the screen).
- Be sure you are dividing the object into equal halves (X=0). Cut the polygons.
- Paste these in Layer #4 (Figure 3).
- Layer #1 should now have only the right half body remaining (Figure 4).
- To Save the objects, choose one layer at a time, and select Export "New." Name them: Horse_RightSide.lwo, Horse_HeadNeck.lwo, Horse_Tail.lwo, and Horse_LeftSide.lwo.
- Return to layout.
- Add a Null object to the Scene, name it Horse_Axis.lwo.
- Parent all four of the horse objects to the Null object.
- Save the Scene as Horse_Setup.lws

You should now have the objects loaded and still in the shape of the complete animal.

Making the Bones

You may be wondering why we split apart the horse object into four separate pieces. Remember





Figures 3-4: The horse is split down the middle, showing left- and right-side objects.

what I said about Bones tending to affect parts of an object that lay closest to the bone when bent? Well, by splitting the object into these parts we have eliminated the possibility of bone influence from bones that lay directly across from each other.

The first two sets of Bones will be used around the inner perimeter of the left and right halves of the body (at X= 0). They keep the seams together so they don't "flex apart" as the leg bones are bent. There are five support bones in each half, plus four bones in each leg area. In all cases, Limited Region is not selected. Please note that the first two groups do not have parenting.

Bone Rest Parameters for Horse_LeftSide.lwo body support group

L_MainSupport-Bone
Rest Position 0.0, 1.34, -0.88
Rest Direction 0.0, 3.6, .0
Rest Length 1.845

L_ChestBone
Rest Position -0.04, 2.44, -1.32
Rest Direction 0.0, 73.8, 0.0
Rest Length 1.085

L_BackBone1
Rest Position 0.0, 2.44, -0.77
Rest Direction 0.0, 20.2, 0.0
Rest Length 1.195

L_BackBone2
Rest Position 0.0, 0.0, 1.06
Rest Direction 0.0, 16.6, 0.0
Rest Length 1.01

L_RearSupport
Rest Position -0.06, -0.12, -1.02
Rest Direction 0.0, 115.0, 0.0
Rest Length 0.805

Bone Rest Parameters for Horse_RightSide.lwo body support group

R_MainSupport-Bone
Rest Position X=0.0, Y=1.34, Z=-0.88
Rest Direction H=0.0, P=3.6, B=0.0
Rest Length 1.845

R_ChestBone
Rest Position 0.04, 2.44, -1.32
Rest Direction 0.0, 73.8, 0.0
Rest Length 1.085

R_BackBone1
Rest Position 0.0, 2.44, -0.77
Rest Direction 0.0, 20.2, 0.0
Rest Length 1.195

R_BackBone2
Rest Position 0.0, 0.0, 1.06
Rest Direction 0.0, 16.6, 0.0
Rest Length 1.01

R_RearSupport
Rest Position 0.06, -0.12, -1.02
Rest Direction 0.0, 115.0, 0.0
Rest Length 0.805

The next two groups are positioned inside the front and back leg of Horse_LeftSide.lwo. They are used to bend the actual legs. These bones have Parenting.

For the front leg section:

L_ShoulderBone
Parent None
Rest Position -0.24, 1.94, -0.7
Rest Direction . 0.0, 90.0, 0.0
Rest Length 0.675

L_UpperLegBone
Parent L_ShoulderBone
Rest Position -0.08, -0.1, 0.53
Rest Direction 0.0, -8.8, 0.0
Rest Length 0.615

L_LowerLegBone
Parent L_UpperLegBone
Rest Position -0.0, -0.02, 0.605
Rest Direction 0.0, 11.2, 0.0
Rest Length 0.57

L_AnkleHoofBone
Parent L_LowerLegBone
Rest Position 0.0, -0.02, 0.565
Rest Direction 0.0, 23.8, 0.0
Rest Length 0.7

For the back leg section:

L_HindQuarterBone
Parent None
Rest Position 0.22, 0.00, Z=0.53
Rest Direction H=0.0, P=80.8, B=0.0
Rest Length 0.855

L_HindUpperLegBone
Parent L_HindQuarterBone
Rest Position 0.0, 0.0, 0.855
Rest Direction 0.0, -31.6, 0.0
Rest Length 0.855

L_HindLowerLegBone
Parent L_HindUpperLegBone
Rest Position 0.0, 0.0, 0.52
Rest Direction 0.0, -41.2, 0.0
Rest Length 0.58

L_HindAnkleFootBone
Parent L_HindLowerLegBone
Rest Position 0.0, -0.04, 0.58
Rest Direction 0.0, -20.4, 0.0
Rest Length 0.685

The next two groups are positioned inside the front and back leg of Horse_RightSide.lwo. They are used to bend the actual legs. These bones have Parenting.

For the front leg section:

R_ShoulderBone
Parent None
Rest Position -0.24, 1.94, -0.7

Rest Direction 0.0, 90.0, 0.0
Rest Length 0.675

R_UpperLegBone
Parent R_ShoulderBone
Rest Position 0.06, -0.1, 0.53
Rest Direction 0.0, -8.8, 0.0
Rest Length 0.625
R_LowerLegBone
Parent R_UpperLegBone
Rest Position -0.02, -0.02, 0.605
Rest Direction 0.0, 11.2, 0.0
Rest Length 0.57

R_AnkleHoofBone
Parent R_LowerLegBone
Rest Position 0.04, -0.02, 0.565
Rest Direction 0.0, 23.8, 0.0
Rest Length 0.7
For the back leg section:

R_HindQuarterBone
Parent None
Rest Position -0.22, 0.00, 0.53
Rest Direction 0.0, 80.8, 0.0
Rest Length 0.855

R_HindUpperLegBone
Parent R_HindQuarterBone
Rest Position -0.04, 0.0, 0.855
Rest Direction 0.0, -31.6, 0.0
Rest Length 0.855

R_HindLowerLegBone
Parent R_HindUpperLegBone
Rest Position 0.0, 0.0, 0.52
Rest Direction 0.0, -41.2, 0.0
Rest Length 0.58

R_HindAnkleFootBone
Parent R_HindLowerLegBone
Rest Position 0.0, -0.04, 0.58
Rest Direction 0.0, -20.4, 0.0
Rest Length 0.685

Now you should have all of the bones placed inside of both Horse_LeftSide.lwo and Horse_RightSide.lwo. Select each Bone in turn and hit "r" to set them. Now, as you rotate a leg bone, the opposite leg will not be affected. There should also be no distortions where we added the support bones. Check out Figure 5 to see how the skeletal structure of bones looks from the Side View.

Animating the Walk

We are now ready to rotate the bones and set up key frames for the walk. So how do we start? How do we create a walk that looks right? Simple. We use a reference. Thankfully, the material we need is as close as the nearest public library. The book "Animals in Motion", by Edward Muybridge, is my reference of choice. In fact, since the book breaks down the walk cycle into several visual steps, the images can serve as the walks' key frames. The angles for the Bone skeleton are based on one of these sequences.

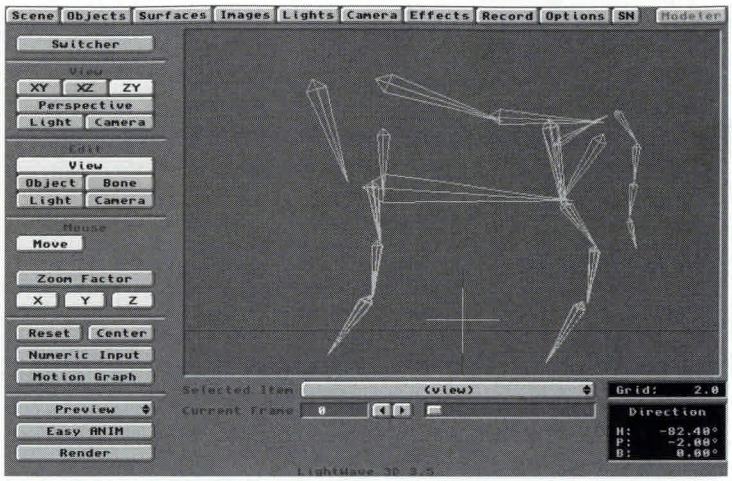


Figure 5: A Side View in Layout showing positioning of the Bones within the horse model.

For this walk, a complete cycle (or stride) will occur in 44 frames. This means that each bone will rotate into its' exact starting position every 44 frames (at 0,44,88,132, 176, etc.).

• Rotate the bones and create keys according to the list below.

Keys and Pitch Settings for Bone skeleton of Horse_LeftSide.lwo:

L_UpperLegBone
0 -6.6
4 -16.4
8 -25.6
12 -30.2
16 -34.8
20 -14.4
24 29.4
28 36.0
32 27.2
36 12.0
40 3.4
44 -6.6
Motion Repeat

L_LowerLegBone
0 11.2
4 11.2
8 11.4
12 5.4
16 3.2
20 -25.6
24 -63.0
28 -50.6
32 -7.8
36 11.2
40 11.2
44 11.2
Motion Repeat

L_AnkleHoofBone
0 27.4
4 37.0
8 37.0
12 30.4
16 33.2
20 -19.4
24 -35.2
28 -23.0
32 -3.0
36 7.8
40 16.4
44 27.4
Motion Repeat

L_HindQuarterBone
0 66.6
4 63.6
8 74.0
12 81.8
16 88.0
20 97.0
24 91.6
28 85.8
32 85.6
36 86.0
40 84.4
44 66.6
Motion Repeat

L_HindUpperLegBone
0 -12.4
4 -27.6
8 -44.0
12 -34.4
16 -22.0
20 -16.8
24 -21.2
28 -25.4
32 -33.6
36 -36.2

40 -31.0
44 -12.4
Motion Repeat

L_HindLowerLegBone
0 21.2
4 39.6
8 49.0
12 85.4
16 60.0
20 38.6
24 47.6
28 50.6
32 47.0
36 29.4
40 11.8
44 21.2
Motion Repeat

L_HindAnkleHoofBone
0 26.8
4 -31.8
8 -26.6
12 -26.6
16 -23.4
20 -12.0
24 -16.6
28 -0.2
32 4.4
36 34.8
40 28.2
44 26.8
Motion Repeat

Keys and Pitch Settings for Bone skeleton of Horse_RightSide.lwo:

R_UpperLegBone
0 4.4
4 30.0
8 31.8
12 21.8
16 14.0
20 6.2
24 -2.6
28 -11.2
32 -19.0
36 -28.0
40 -11.8
44 4.4
Motion Repeat

R_LowerLegBone
0 -30.0
4 -55.0
8 -25.4
12 11.0
16 11.2
20 11.2
24 11.2
28 11.2
32 11.0
36 11.0
40 -12.8
44 -30.0
Motion Repeat

R_AnkleHoofBone
0 -44.2
4 -39.0
8 -24.4
12 0.6
16 5.0
20 17.0
24 25.2
28 29.0
32 29.0
36 35.2
40 -8.2
44 -44.2
Motion Repeat

R_HindQuarterBone
0 94.4
4 90.0
8 86.0
12 91.6
16 85.2
20 77.6
24 76.0
28 89.8
32 101.8
36 108.2
40 116.2
44 94.4
Motion Repeat

R_HindUpperLegBone
0 -20.6
4 -20.8
8 -24.6
12 -45.8
16 -35.8
20 -30.4
24 -35.4
28 -56.8
32 -62.4
36 -57.6
40 -53.8
44 -20.6
Motion Repeat

R_HindLowerLegBone
0 47.2
4 43.2
8 40.2
12 49.4
16 30.2
20 27.2
24 19.8
28 42.6
32 53.2
36 66.8
40 50.6
44 47.2
Motion Repeat

R_HindAnkleHoofBone
0 -10.0
4 3.0
8 -5.2
12 4.4
16 28.2
20 32.0
24 25.8
28 -48.4
32 -53.2
36 -34.2
40 -16.0
44 -10.0
Motion Repeat

Now do a Preview animation set to 44 frames. You should have a very convincing walk cycle. Note that at this point it merely walks in place. To make it walk forward, it will take a little bit of experimentation to find exactly the right position for the Horse_axis.lwo null. My horse object moves 2.15 meters for every complete stride.

You should create keys for the axis null every four frames. This allows you to fine tune the placement of the horse, and prevent "sliding" during the walk. For a look at a rendered frame of the horse walk scene check out the color section.

Options

There are a few things that can be added to make the animation more natural:

1) Put some bones into the head and neck to bob the head up, down, and to the side slightly as it walks. Put a larger bone at the base of the neck to keep it from being distorted as you bend and rotate the head.

2) Do the same thing with the tail.

3) The movement of both head and tail should be synchronized to the 44 frame loop of the walk.

Wrapping Up

There are many other motions you can achieve with the object. I have successfully animated a gallop and a rearing horse. In fact, I have used the rearing-up motion to animate two mythological Centaurs battling each other with swords and shields. This scene really took some planning to put together.

This wraps up this tutorial on walking a horse. I hope that you have gained some valuable tips, and the inspiration to try some motions out on your own.

LWP

Jim Curtis specializes in character modeling and animation. He can be reached at JMC Graphics by voice at (216) 354-6239.

Surface Effectors

New Plug-in Easily Creates Complex Effects

by Prem Subrahmanyam

Those of you who enjoy using LightWave 4.0 and beyond know the power of plug-ins. Third-party plug-ins available for LightWave can do many extraordinary effects, like particle systems, physics-based simulation, post-processing of rendered images, and customized shaders. While examining the host of new plug-ins included with the shiny new LightWave 5.0 and learning to program using the LightWave plug-in API, I was struck by a simple idea. In the vein of NewTek's Effectors plug-in (which allows you to interactively distort your geometry by animating various appropriately named nulls around your scene), I thought, "Why not allow users to modify all the basic surface attributes (color, diffuse level, luminosity, transparency, reflectivity, and index of refraction) by animating appropriately named nulls around the scene." And thus was born Surface Effectors.

By naming a null object appropriately, and further embedding command-style parameters in its name or attaching (via parenting) various other appropriately named nulls to it (called "attribute effectors"), any surface in LightWave to which the Surface Effectors shader plug-in is attached will react to the parameters attached to the null and incorporate those values into its shading equation. The shader reacts according to the distance in 3D space from the null to the surface in question, falling off using a variable soft-edge function. In addition, effects made with Surface Effectors can be modulated using a completely animateable (read scaleable, rotateable, and moveable during the course of an animation) fractal noise texture. Fractal noise has been dubbed by many to be the universally most useful texture on the planet and is often heavily used in LightWave renderings to break up the "computer-clean" look. The animateable nature of Surface Effectors' fractal texture opens up a new world of possibilities in itself.

Surface Effectors make possible effects that are very difficult (and occasionally next to impossible) using LightWave's current texture mapping schemes. Uses that come immediately to mind include luminous glows to simulate heating of metallic objects, punching transparent holes in surfaces, making burn marks on an object after a laser bolt has hit it, making a character subtly blush, or making a nice smudge o' dirt. Even simple effects, if done with texture maps or LightWave 5.0's stackable textures, take a long time and involve tweaking numbers, rerendering, painstakingly drawing things on image maps, making image sequences, etc. In a word, time-consuming. Surface Effectors makes these effects easy to produce. I've developed several advanced effects that are distributed with the plug-in as tutorial scene, one of which follows.

How They Work

First, we need to gain a better working understanding of how Surface Effectors operate. The Surface Effectors package comes with a single plug-in, named "surfeff.p" (along with documentation and tutorial scenes) that you install and load into Layout. To apply it to a surface do the following:

• Bring up the "Surfaces" panel in Layout and select the surface you wish to use.

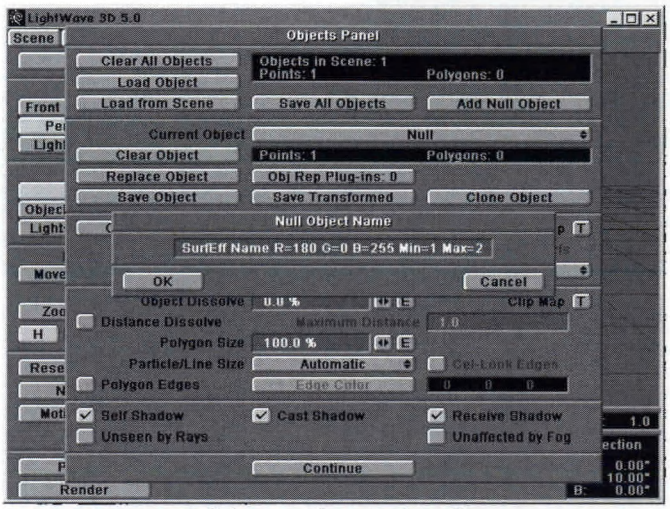


Figure 1: Renaming a Null object to make it a Surface Effector.

• Click the "Shader Plugins:" button. This will bring up a panel with four selectors (allowing the specification of up to four shaders to be applied to your surface).

• Find the first empty slot, and click and drag down to the "Surface_Effectors" choice and release.

That's all there is to it on the shader application end. Clicking the Options button will give a little blurb on how to define a null as a surface effector.

Now that we've done that, we need to define an object (usually a null, but it doesn't have to be under Win95 or NT) to modify surface parameters. To make a null as a Surface Effector, bring up the Objects panel in Layout and do the following:

• Click the Add Null Object button

• Click the Save Object button. You should now have a subpanel titled Null Object Name.

•Type the following in the text field, ("MyName" can say anything you want) and then click OK:

SurfEff MyName R=180 G=0 B=255 Min=1 Max=2

• Now, keyframe this null over close to the object to which you applied the "Surface_Effectors" shader and render.

You should see all areas of your object that are one meter or less from the null shaded in a solid purple. Those parts between 1 and 2 meters away will be

shaded in ever-more faint shades of purple, fading to the original object texture at distances greater than 2 meters away from the null.

Let's get a little fancier adding some fractal noise and fading the effect a tad. Do the following:

• Create a null object and rename it "Frac MyName Edge Freq=5 Intense=2".

This defines a fractal texture with a frequency (i.e. detail) level of 5 and contrast set to 2, applied to the "edge" between the min and max effect radii.

• Now set the parent of this object to the SurfEff object created previously and re-render. The smooth purple area should now be broken up with fractal noise.

• Now, animate the Frac null any way you like, rotate it, scale it, move it, the texture on your object will move with the null. Neat, huh?

• Finally, create a Null named Fade, make the SurfEff null its parent, and keyframe it to an X position of 0.5. Render.

What you should see now is that the purple fractal texture blob has been faded out to about half of what it was in the previous render. The term given to nulls like the Fade null we just created is an "attribute effector." We can create nulls for each of the surface parameters that a Surface Effector can modify. Thus we could, for example, use an attribute effector child of a Surface Effector to change the color of an object dynamically (using a null named "Colr" as a child of the SurfEff null). One other nifty thing about attribute effectors is that if you parented one surface effector to another surface effector with an attribute effector animating a particular attribute, any descendant effector will inherit that parameter as well. Consider the following hierarchy:

SurfEff MyParent
  Colr (child of "MyParent")
  SurfEff (also a child of "MyParent")
    SurfEff ("grandchild" of "MyParent")

The child and grandchild Surface Effectors will inherit whatever value "Colr" is keyframed to. This allows scenarios where we could create a bank of Surface Effectors descended from one and adjust them all by adjusting the parent's attribute.

OK, well let's get to business applying Surface Effectors to do real-life (or shall we say, virtual-life) effects.

The Old Torpedo Hits the Shield

We've seen it in *Star Trek, the Next Generation* and we've all probably played around with trying it (that, and keyframing some *Star Wars* models in various dogfights) or at least thought about it...making a photon torpedo look like it hit a defense shield surrounding a starship. Well, how do we do it? Image map sequences? Texture velocities? Those are possibilities, but they either add unnecessary tedium or introduce loss of control over the effect. Using Surface Effectors, this effect can be done easily and with a more precise control. In fact, a portion of this effect cannot be done currently in LightWave without Surface Effectors. Let's get to it.

• Set up a scene with about 50 frames for the animation. You might want to make this effect slower or faster than what I've done here. If so, just choose Scale All Keys (Scene panel) once you've set things up and scale the keyframes to make the effect slower or faster.

• Place the camera at XYZ: -5, 4, -350

• Now, we need a ship. The "SpaceDestroyer" object that comes with

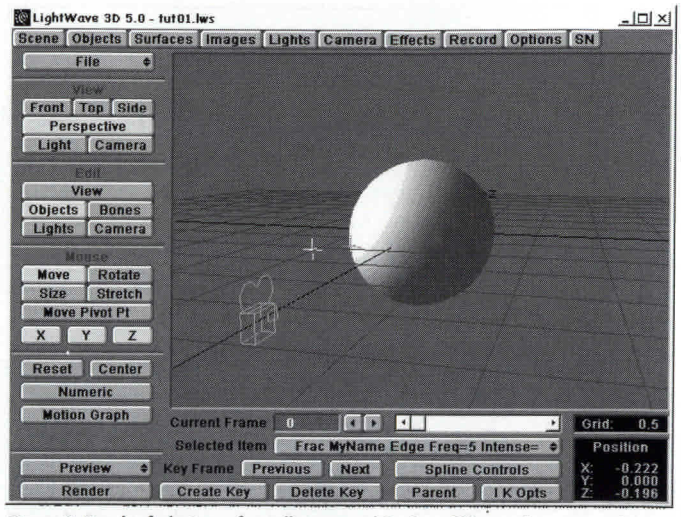


Figure 2: Result of placing a fractally textured Surface Effector close to an object.

LightWave will do quite nicely. Load it into Layout and keyframe it at XYZ: 0, 0, 0 with a rotation of HPB 34, 4, 0.

• In Modeler, create a ball using Tesselation, level 2 with XYZ radius values of 135, 80, and 145 and a center at -2, 4, 17. Give this object a surface of "Shield" and save it to whatever name you'd like. Load it into Layout and make the destroyer its parent.

• The important thing now is the surface settings for the shield. Give it the following texture parameters:

Shader Plugin	Surface Effectors
Surface Color	91,199,255
Surface Color Texture	
Texture Type	Fractal Noise
Texture Opacity	100% (for LW 5.0 users)
Texture Color	0,0,0
Frequencies	5
Contrast	3.0
Texture Size	5.0, 5.0, 218.0
other parameters	default values
Luminosity	100%
Diffuse Level	0%
Specular Level	0%
Reflectivity	0%
Transparency	100%
Refractive Index	1.0
Smoothing	On

• Now go to the Camera panel and set Trace Refraction to on. This is very important - as an aside, LightWave will not fire refractive rays for any surface whose Index of Refraction is set to 1.0.

• Now, create two nulls with the following names:

SurfEff Warper I=1.25 S=0.3 Min=0 Max=70
SurfEff Glow T=0.5 Min=150 Max=100

What the first one does is set the Index of Refraction ("I") to 1.25, the Specularity ("S") to 0.3 (i.e. 30%), and the min and max effective radii to 0 and 70, respectively. The second sets the transparency ("T") down to 50% (0.5)

see Surfaces, page 18

Instant Atmosphere

Give Spotlight Projections a Whirl with 5.0

by Patrik Beck

As LightWave evolves, it is moving closer and closer to a true virtual movie studio. It is only a matter of time till some LightWave maniacs release their own version of *Toy Story*.

With the rather unusual personalities of most of the 'Wave heads I have met, I have a feeling that the plot would not be something that you would likely see from politically-correct Disney Studios. Chances are the movie would be more along the lines of some sort of sci-fi action-adventure. But I would expect to see one visual element that seems to show up in every action/adventure film I have ever watched: fans.

No matter what the movie, it always seems to have at least one scene with some backlit fans spinning in the background. I don't understand it but it's gotta be important, so we have to have a way to do it with LightWave.

Enter Version 5.0

Fortunately, a new feature in the lighting panel of LightWave version 5.0 makes simulating this effect fairly easy. There are three steps to this effect. The first is to create the fan parts in Modeler, then create an image sequence, then apply it to a spotlight inside a LightWave scene.

To create the fan object parts, use the make box feature to create a flat plane that is two meters square. Put the plane in a background layer and then in the foreground use the make disk function to create a cylinder that measures one meter across and about a meter thick. Increase the amount of divisions to create a smoother circle. Put the flat plane back in the foreground and the cylinder in the background and use the "solid drill core" function-subtract to punch a hole in the middle of the flat plane. Hit (m) to merge any extra points generated during the subtraction process and save the object as "FanCase.lwo"(Figure 1).

Next we make the fan blades. Fan blades come in a large number of shapes, ranging from perfectly square to rounded teardrop shapes. I suggest for now we stick with a simple blade design and improve on it later is necessary. Put the fancase.lwo object in a background layer to use as a reference. Use the make box function again and draw out a square that is the approximate size of a fan blade. We want to reshape this box a bit so lets give it a few extra points to move around by hitting the (n) key and giving the box three "X" segments and three "Y" segments. Go to the modify menu and, by selecting the "drag" tool, slide the points around to get an approximate blade shape (Figure 2).

Once you have a proper blade shape, it is necessary to duplicate them around the axis. Under the multiply menu select clone. We want our fan to have a total of five blades, so enter number of clones as "4" and degrees of rotation around the "Z'" axis as "72".

You should now have a object that looks a lot like a fan. (You will know pretty quickly if you have done it right or not). Save the object as "FanBlade.lwo."

Creating a Sequence

Enter the layout and load both the "FanCase.lwo" and the "FanBlade.lwo"

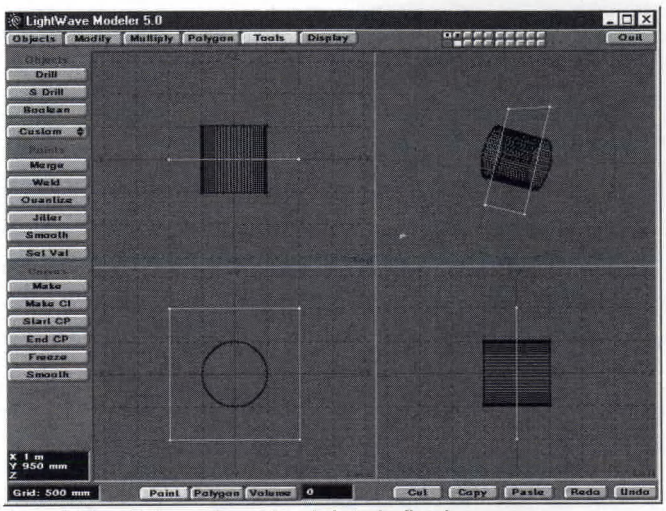


Figure 1: The cylinder used to make a hole in the flat plane.

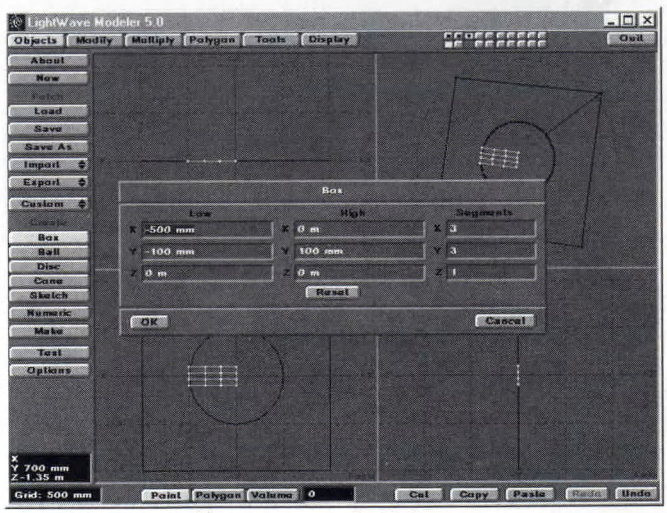


Figure 2: The setup used for constructing a fan blade.

and parent the blade to the case. Create a key frame for the blade at frame 30, and give it a Bank rotation of 72 degrees. Generate a looping preview and you should see continuously spinning fan blade animation (Figure 3).

Move the camera forward on the Z-axis till the fan assembly fills the screen and key frame it there. Color all the polygons in the scene completely black (0, 0, 0), then create a completely white (255, 255, 255) solid background color (Figure 4).

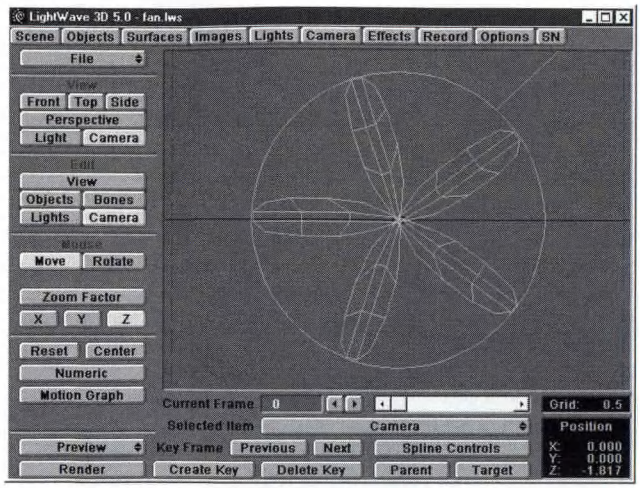


Figure 3: The Layout screen showing the fan scene.

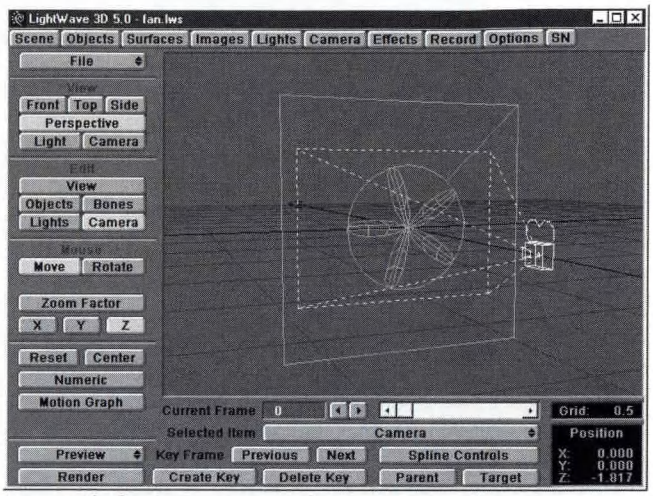


Figure 4: The fan scene as it appears from a perspective view.

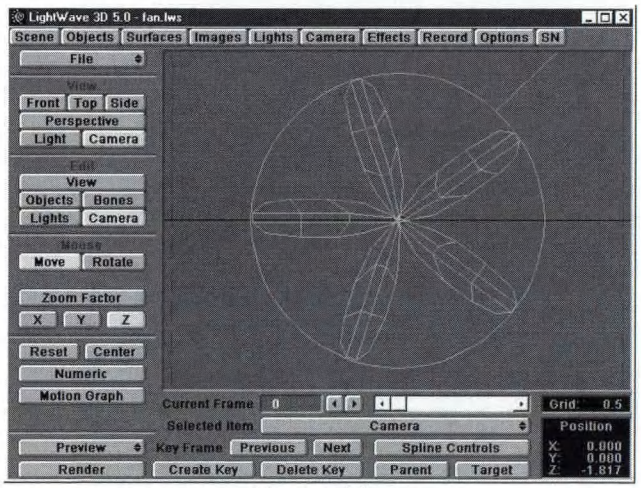


Figure 5: A perspective view of the NewTek logo scene.

Figure 6: The final scene uses multiple Spotlight Projection maps

It is now time to render the images. You can render in any resolution, size is unimportant in function, though higher resolution will give better looking final results, as will adding anti-alising. Because we are rendering a simple black and image, you can set the camera to quick shade mode for faster rendering. Save the images as "FanXXX.iff."

Putting It in a Scene

The best application for this is to add it to an existing scene that has walls and/or a floor. Otherwise go to the newt/object drawers and load the ground.lwo and Logo.lwo objects. Set up the scene so that the logo is siting on the ground plane and is properly framed in the camera. Go to the images panel and load the "Fan" sequence we just rendered.

Next, go to the lights panel. Turn the ambient intensity to 0% . Change the default light type from "distant" to "spot." Towards the bottom of the lights menu is the option for "projection image," select the fan sequence. Back in Layout the light needs to be positioned to properly shine on the logo object. Move the light to what looks right and then switch views to "light" to see exactly where the light is aiming, and key frame it there.

Tweaking the Scene

Do a test render. You should see a very intense shadow of a fan falling across your logo. You will probably want to adjust it a bit unless you are going for a very stark looking image. The first thing to do is go back to the lights menu. Make a clone of the spotlight and remove the projection image from the second light and reduce the intensity of both lights by half. Re-render the image and you will see a less drastic shadow (Figure 5). Spotlights with projection images still have all the options of a typical spotlight. The light can be colored or changed over time with envelopes. Spotlights with shadow maps enabled will cast shadows just like having and object placed in front of a projector.

Getting Cute

The setup previously described would be used most often in a situation where a fan is behind a camera. You may want to put your fan assembly within the scene and still use the projected fan image sequence. That way your are not limited by the object placement to where the shadows fall, as would be the case if the fan blades actually casting shadows.

You will probably want to spend a little more time building the fan assembly if you are planing to have it appear in the scene.

If you are really lazy, you could just load the fan sequence as a background image and have the image projecting spotlight back lighting the object. If you are not lazy, you can build, texture and animate the shafts of volumetric light which is the other thing that seems to be universal in action/adventure movies. For now, the ominous spinning fan blades is a quick and easy way to add a touch of mystery to your animations. LWP

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continued from page 7

setup will be fairly similar.

Amiga Setup

Your Amiga Ethernet card will come with a driver disk. The disk should have an Install program to install the driver for you. If not, find your SYS:Devs directory, create a new directory there called Networks, and copy the driver into the SYS:Devs/Networks directory. The designation SYS: refers to the drive that you boot Workbench from, so you could substitute DH0:Devs/Networks if your boot drive is DH0. If you use the SYS: designation, the Amiga will know you want your Workbench boot partition.

INET-225/NFSd

When you run the Installer program included with INET-225, you will be asked for a user name, host name (computer name) and IP number, plus a few other questions, like the name of your Ethernet driver, which must already be installed. The driver will be in the SYS:Devs/Networks directory, and have a name like hydra.device or ariadne.device if you are using either a Hydra Ethernet card or Ariadne Ethernet card, respectively. INET-225 supports a variety of TCP/IP connections, including modem and Internet, so be sure you select the Ethernet option, and use the file requester to point to your Ethernet card driver file in SYS:Devs/Networking. INET-225 picks a home directory for you; just accept the defaults. Answer the rest of the prompts as they come up. One of the question panels asks if you want to use DNS servers, and it is on by default. Turn this off before continuing. When the install is finished, you will have an icon called StartInet in your INET:C directory. Edit the tooltypes of this icon to remove the parentheses around the (NFSD) option. Drag this icon to your SYS:WBStartup drawer so it starts up every time you start your Amiga.

Install the INET NSFd software, and when you are finished, you will need to edit the file INET:rexx/startnfsd.rexx. Scroll down until you find the line that refers to your exports. It should look like this:

```
* The exports variable declares the partitions
you wish to export.
*/
exports = 'dh1:/ dh2:/ VideoB:/jonesproject/'
```

Change the drive names to match whatever drives you intend to make available to your PC. Note the colons and slashes after the drive names. A word here on performance: If you export the entire drive as I have in my example, the access to this drive will be slower than if you just export a single directory, since the PC will have to build a directory table of all the files and directories that it finds when it connects to that drive. Limiting access is both faster and safer. When you are done with the entries here, save this file.

Reboot your Amiga, and the INET software and NFSd Server software will be started automatically.

The only thing left to do is to test the NFS connection to the PC. On the PC, start up the NFS Server software. Back on the Amiga, open a shell and type:

```
nfsmgr mount pc1:/d N
```

You should see an icon appear on your Workbench in a couple of seconds with the name N. If you get an error message, either the NFS Servers exports file on the PC has not been set up properly or your INET:rexx/startnfsd.rexx file is incorrect, and you'll need to check to see if you have your exported drives listed properly, and that you have the proper IP address entered there for your Amiga. Double-click the N icon, and it should open up to an empty window. Select the menu item Window/Show/All Files, and you should see all the folders on your PC's drive D:\. Start up your favorite file utility program like Directory Opus, and list the drive N:. It should appear and behave just as any other Amiga hard drive partition, except that loading or saving files to/from it will be slower than a regular hard disk.

Repeat the nfsmgr command for each PC drive that you set up for exporting. Note that pc1:/d refers to computer pc1 and drive D:, change these to match your system. Be careful to use the colon and slash exactly as shown in the example. The last part, N, is the name that will show up on your Workbench when it gets mounted. This could be anything that you like, and you can rename it from Workbench at any time, just like you can rename any other disk. Stay with N for now, it will be used later in the Screamernet examples. If you want to automate the mounting of your PC drives, you can type the mount commands with a text editor and then save that file and attach an icon to it so you can just mount your PC drives whenever you want by clicking the icon. If you want the drives automatically mounted every time that you start your Amiga, drag that icon into your SYS:WBStartup drawer after the StartInet icon.

All of the PC NFS Client software that I looked at worked through Windows itself, so to mount the Amiga drives there, you only have to open up the Network Neighborhood and use the Map Network Drive option to mount and open your Amiga drives. If you are using Windows NT, use the File Manager and use the Connect Network Drive option in the disk menu. You must assign a drive letter to your Amiga drive. Give the Amiga drive that has your LightWave or Toaster software on it the letter V. If you want these drives to always get mounted every time that you start your system, check the option Reconnect at logon before you click OK to mount this drive.

AmiTCP/Samba

The AmiTCP installation is similar, just make sure you select an Ethernet connection and select the proper Ethernet card. AmiTCP will ask for your computer name in two parts, which is technically correct for proper Internet use, but confusing within the context of our simple setup. When asked for the host name, enter amiga1, and when asked for the domain, enter system. You will then be allowed to enter an alias, enter amiga1 to this question. When it asks you for the location of your home directory, enter AmiTCP:. Note the colon after the word, don't forget that. You will be asked for domain names to search, leave this section blank and just click continue to skip this section. You will also be asked if you want to have servers started when AmiTCP starts, be sure and answer yes to this question. The installer will also ask if you want to make alterations to your user-startup, answer yes to these as well. During the install process, AmiTCP will open a shell for you and prompt you for your first-time password. Enter it, and you're basically done with AmiTCP after this.

Samba Installation

Installing Samba is fairly cryptic, and involves studious use of the installation instructions and a text editor. There are two versions of Samba, written by different authors. I prefer the newest version, listed in Aminet archives under the name Samba-1.9.15p8.lh. It starts as a deamon automatically when AmiTCP starts, is more robust, and survives a system reboot (either the Amiga or PC) without having to restart the other system. You will also need a file called ixemul-040fpu.lha or ixemul-020fpu.lha, depending on whether you have an '040 or '020/'030 CPU in your Amiga. The ixemul files are located in dev/gcc/ on Aminet sites. When this file is unpacked, you have the files ixemul040fpu.library and ixnet040fpu.library. Rename them to ixemul.library and ixnet.library, and then copy them to your LIBS: directory.

Create a Samba directory in your AmiTCP: directory, and unarchive the Samba files there. Load up and print out the Amiga Installation Notes file for instructions on how to perform the file editing and joining. Basically, you have to edit two of the files. The first file is Amitcp:Samba/lib/smb.conf. To add the definitions of the drives that you want exported to your PC. Scroll down until you see the section that looks like this:

```
[SYS]
  comment = System boot volume
  valid users = pcguest
  path = /SYS/
  read only = yes
  public = yes
```

Change this to match the drive(s) on your sys-

tem that you want exported. If you want to export DH1: and a Flyer VideoB: drive to the PC, change the above entry and use cut and paste to create a second drive entry so it looks like this:

```
[DH1]
  comment = amiga1 DH1: drive
  valid users = pcguest
  path = /DH1/
  read only = no
  public = yes

[VideoB]
  comment = amiga1 Flyer VideoB: drive
  valid users = pcguest
  path = /VideoB/jonesproject/
  read only = no
  public = yes
```

The line that starts with comment= will show up in File Manager next to the drive name when you select the Connect Network Drive option. Be careful of how you specify drive names here. Note that the standard colon after the drive name in the path line is assumed. Do not actually type a colon in the path to your exported drives. In the second example, I also only exported the "jonesproject" directory on my Flyer VideoB drive instead of the entire drive. I also changed the read only = definition to no, so that the PC can write to these drives. Do not change the valid users line, leave it set to "pcguest." Save this file when you are finished entering your Amiga drives for exporting.

Next, edit the file Amitcp:Samba/inetd.conf.addon. It will look like this:

```
# This is for Samba
# You should modify the arguments for nmbd to suit your setup and network.
netbios-ssn stream tcp nowait root AmiTCP:samba/bin/smbd smbd
netbios-ns dgram udp wait root AmiTCP:samba/bin/nmbd nmbd -n k4315 -G Kampsax -C "Amiga 4000/030 på værelse 4315 (rask@kampsax.dtu.dk)"
```

At the end of the second line, change k4315 to amiga1, which is your computers (host) name. Change Kampsax to workgroup, which is your workgroup name. Change what is inside of the quotes to a description of your system. When you are finished, it should look like this:

```
# This is for Samba
# You should modify the arguments for nmbd to suit your setup and network.
netbios-ssn stream tcp nowait root AmiTCP:samba/bin/smbd smbd
netbios-ns dgram udp wait root AmiTCP:samba/bin/nmbd nmbd -n amiga1 -G workgroup -C "Amiga Flyer"
```

Save this file, and follow the directions in the "Amiga Installation Notes" file that pertain to joining the various files together. You can use cut and paste in the Amiga "Ed" text editor to do this if you have never used the join command before.

Next, load up the file Amitcp:db/ch_nfstab. Cursor down to the very bottom of this file, and enter the next two lines:

```
pc1:/d N:
pc1:/e M:
```

The first part of each line, pc1:/d, refers to computer pc1 and drive D or drive E. Pay attention to how the colons and slashes are placed. The last part, N and M, refer to the names that your PC drives will show up as on the Amiga Workbench. These names can be anything that you like, but keep them short and do not use spaces in the names. Again, stick with N: and M: now, the ScreamerNet examples will expect this. When you are finished, save this file.

And last, load up the file S:User-Startup. Cursor down until you see the section where the command AmiTCP:bin/startnet is located, and cursor up a line or two above that command, and hit Enter a couple of times to open a blank line or two, and add the following lines to the file. Make sure that you add them before the AmiTCP:bin/startnet command line.

```
assign etc: amitcp:db
assign tmp: t:
assign proc: nil: path
```

Save this file when you are finished, and this completes the AmiTCP/Samba setup. Whew! Isn't shareware software just loads of fun? Reboot your Amiga, and AmiTCP and Samba should start up automatically when your system boots up.

To test things out, go to the PC and start up the NFS Server software. Go back to the Amiga and open up a shell and type the following:

```
ch_nfsmount N:
```

If you get an error message, either your AmiTCP ch_nfstab file has an incorrect definition, or your PC NFS Server software exports file has an error. You should see a disk icon with the name N show up on your Workbench within a few seconds of entering this command. Double-click on this icon, select the Workbench menu option Window/Show/All Files, and you should see all the folders on your PC drive D. Repeat this command for M:, and that drive will show up, too. If you want these drives to be automatically mounted every time you start up your Amiga, edit your S:User-Startup file, and put the ch_nfsmount commands at the very end of the User-Startup file.

Samba works through Windows itself, so to mount the drives there, you only have to open up the 'Network Neighborhood' and use the Map Network Drive option to mount and open your Amiga drives. You must assign a drive letter to your Amiga drive. Give the Amiga drive that has your Lightwave or Toaster software on it the letter V. If you are using Windows NT, use the File Manager and use the Connect Network Drive option in the disk menu. If you want these drives to always get mounted every time that you start your system, check the option 'Reconnect at logon' before you click OK to mount this drive.

We'll get to ScreamerNet in Part Two of this primer.

John Crookshank is president of MicroTech Solutions, Inc., a Chicago-based video and graphics systems dealer, and one of NewTek's appointed "Top Ten Dealer" group members. MicroTech can be reached at 630-495-4069, and their World Wide Web address is http://www.mt-inc.com/.

Software Resources:

INET-225, INET-NSFd, AmiTCP v4.x

Available at Amiga software dealers. (Commercial software). Also see the Interworks site at http://www.iworks.com.

Amiga Samba Server

Aminet Internet archive sites, /pub/aminet/comm/net/samba-1.9.15p8.lha.

Ixemul software required for Samba

Aminet Internet archive sites, /pub/aminet/dev/gcc/ixemul-040fpu.lha, or /pub/aminet/dev/gcc/ixemul-020fpu.lha, depending on your CPU.

Internet Sites

A web-browsable access to Aminet can be found at: http://www.germany.animet.org/aninet/.

Sample Aminet Internet FTP archive site: ftp.netnet.net.

All of the non-commercial Amiga software mentioned here as well as the TropicNFS software is also available at ftp.mt-inc.com, /pub/amiga/ and /pub/windows/ as well as on the World Wide Web at http://www.mt-inc.com/amiganet.htm.

LWP

with effective radii of 150 for the Min and 100 for the Max...wait, you say, you have the Min greater than the Max...what gives? Well, when the Min radius is greater than the Max, the shader will limit the effect to a spherical shell between the two radii, ramping to full dead in between the two values and falling off towards either edge. This is very effective to create a *shockwave-type* of effect when we move the effector's area of influence through an object.

• Finally, create a null named Fade Glow and make the "SurfEff Glow..." null its parent.

Now, we're ready to do the animation. For the torpedo, use a point light with the following settings:

Intensity	0
Light color	0, 180, 255
Lens Flare	On
Flare Intensity	Enveloped (more about this later
Central Glow	On
Central Ring	On
Fade Off Screen	On
Random Streaks	On
Ring Size	0.12
Ring Color	0, 95, 141
Rotation Angle	Enveloped

Everything else should be set to off.

• Keyframe this light out of the camera view up to the right top corner at frame 0.

• At frame 30, have the light keyframed right on a point at the surface of the shields. Set the Intensity Envelope to the following:

50% at frame 0.
50% at frame 26 (set Linear on Spline Controls).
130% at frame 30.
0% at 32.

What this will do is cause our torpedo to flash as it hits the shield and then fade out rapidly.

• Set the Rotation Angle Envelope to whatever you want. (I've noticed that most Klingon-style torpedoes rotate about 45 degrees per second.)

• Now, enter the Surface Effectors.

The Warper effector is used for a neat little trick, namely, giving the look of a transparent "bubble" being poked by the torpedo.

Since we have Trace Refraction on for the camera, the index of 1.5 will cause distortion around the area of the effector as we bring it close to the shield. This effector should be keyframed back just far enough not to effect the shield at all initially. Then, from frames 29 to 32, punch it close to the surface of the shield right at the point of impact of the torpedo. Pull it back to its initial position by frame 39. This should give us a nice distortion of the ship inside the shield right around the area of impact of the torpedo.

The second effector ("Glow") will now come into play. Remember that the shields are 100% transparent, but the Glow effector is set to be only 50% transparent. Hence, as it "passes through" the shield, it will reveal a band of it (the area between the two radii, as we have it set to be a spherical shell.

This effector should also be keyframed back far enough to prevent it from affecting the shield at all initially. Then, as the torpedo hits the shields at frame 30, the Glow effector should be keyframed just close enough to begin to reveal the surface of the shields. Then, to make the "shockwave" travel through the surface, keyframe the Glow effector to be flush against the shields by frame 45. The final step is to fade out the Glow effector by the time its band of effectiveness reaches halfway through the shields. Remember the Fade null that we made a child of the Glow effector? The Fade null's position along its parent's local X axis determines the "fadedness" of the effect (0 for no fading, 1 for fully faded out). So, the Fade null is keyframed at X=0 for frames 0 and 35 (again, be sure to set Linear on for the Spline Controls), and then keyframed to 1.0 by frame 45. This causes the Glow effect to fade away by the end of the sequence.

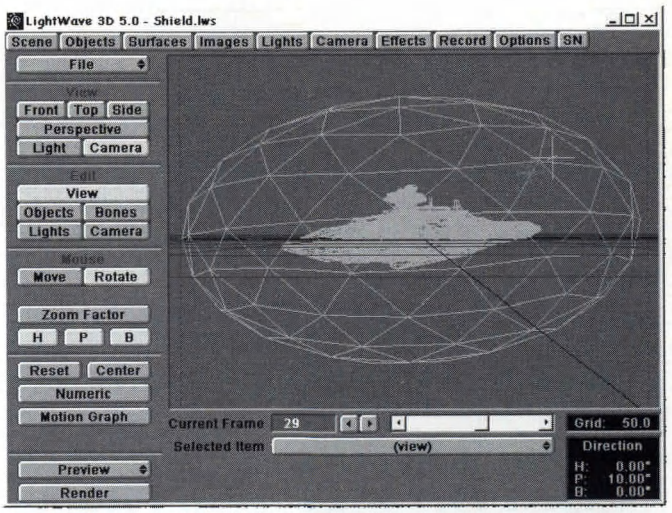

Figure 3: Placement of the shields, torpedo light and Warper Surface Effector.

That's it. Probably an hour's work (maybe two) and we have a really cool animation. Remember that I mentioned an effect that could not be done in LightWave without using Surface Effectors? Well, there is no way to animate the Index of Refraction at all in LightWave (even with a map), so the distortion effect that the Warper surface effector produced is not possible in LightWave apart from Surface Effectors.

Surface Effectors can be a very useful tool in an animator's toolbox, readily lending themselves to creating localized surface effects like luminous spots, transparent holes, blushing characters, etc. In addition, combinations of several effects (especially when using the built-in fractal noise) can lead to quite stunning pyrotechnic effects achieved in record time using this tool, effects such as defense shields, burning holes, and plasma rings. I would like to add that developments are under way to allow LightWave 5.0 users to manipulate surface effector values via a GUI interface, rather than solely by object-name based scripting and should be completed by the time you read this article.

How to Order

Surface Effectors is available currently for both LightWave 4.0 and 5.0 on Intel and Alpha platforms for $40 and $60, respectively). To order, send e-mail to prems@star.noblestar.net, or call 1-904-575-6051 between 11 a.m. and 6 p.m. EST.

Prem Subrahmanyam has been a freelance animator/programmer amalgam based in sunny (and rainy) Tallahassee, Florida for the past six years (and a Tally native all his life). He has been an avid user of LightWave for both animation and still the last four years.

Shield Shock

Surface Effectors were used to animate the effect of a photon torpedo striking a starship shield than dissipating its energy over the shield's surface.

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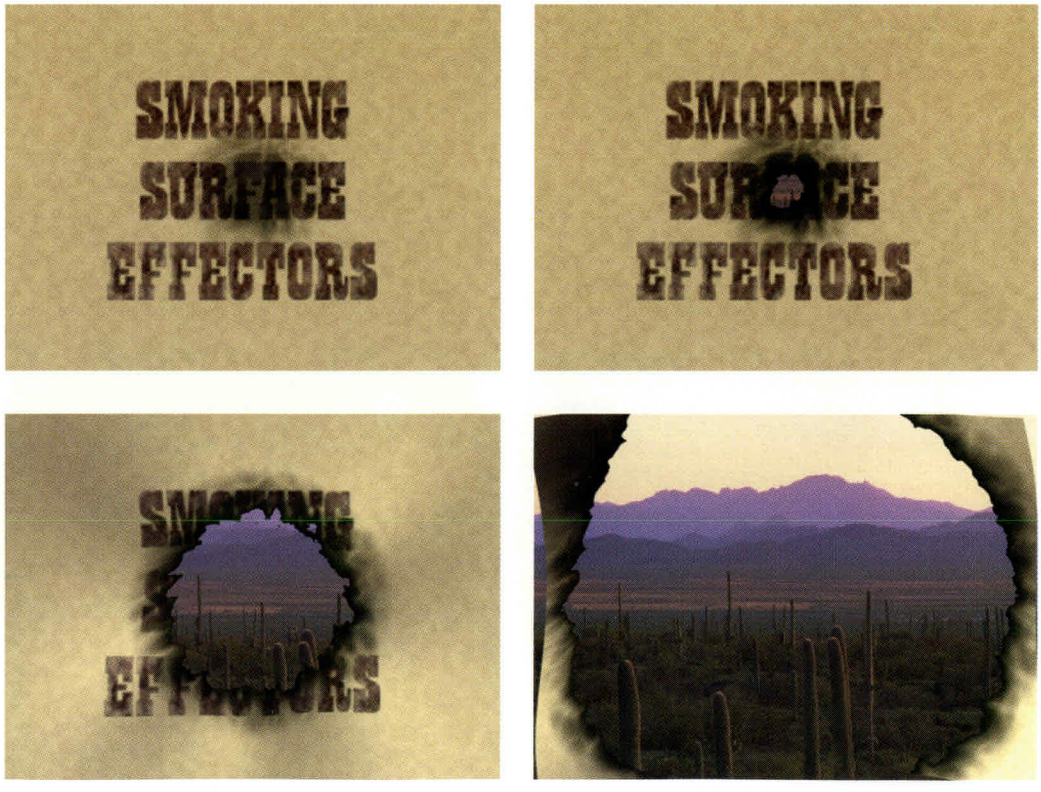

Burn Through

Surface Effectors also was used to create the burn-through effect in the sequence at right.

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